

## Features And Application

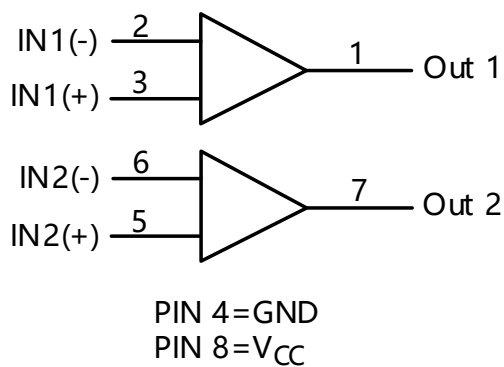
- Single or Split Supply Operation
- Low Input Bias Current
- Low Input Offset Current
- Input Common Mode Voltage Range to Gnd
- Low Output Saturation Voltage
- TTL and CMOS Compatible

## Description

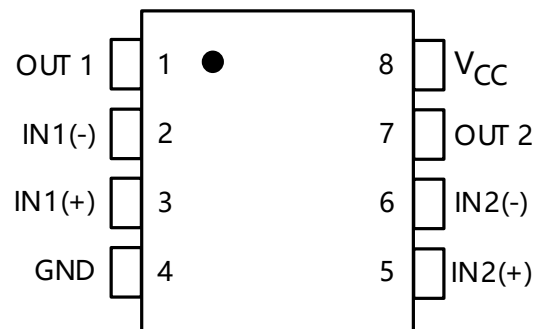
The CBM2903 consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for two comparators which were designed specifically to operate from a single power supply over a wide range of voltages.

Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; MOS clock timers; multivibrators and high voltage digital logic gates.

## Logic Diagram



## Pin Assignment



## CATALOG

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## Maximum Ratings

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	<b>Power Supply Voltages</b>		
	Single Supply	36	V
	Split Supplies	±18	
V <sub>IDR</sub>	Input Differential Voltage Range	36	V
V <sub>ICR</sub>	Input Common Mode Voltage Range (1)	-0.3 to VCC	V
I <sub>SC</sub>	Output Short Circuit to Ground	Continuous	
I <sub>IN</sub>	Input Current, per pin (2)	50	mA
T <sub>J</sub>	<b>Junction Temperature</b>		
	Plastic Packages	150	°C
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1mm from Case for 10 Seconds	260	°C
P <sub>D</sub>	<b>Power Dissipation @TA=25°C</b>		
	Plastic Package	570	mW
	Derate above 25°C	5.7	mW/°C

\* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied.

Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Functional operation should be restricted to the Recommended Operating Conditions. Notes:

1.Split Power Supplies.

2.V<sub>IN</sub><-0.3V. This input current will only exist when voltage at any of the input leads is driven negative.

## Recommended Operating Conditions (Ta=-40~85°C)

Symbol	Parameter	Min	Max	Unit
VCC	DC Supply Voltage	±2.5 or 5.0	±15 or 30	V
TA	Operating Temperature, All Package Types	-40	+85	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation,  $V_{IN}$  and  $V_{OUT}$  should be constrained to the range  $GND \leq (V_{IN} \text{ or } V_{OUT}) \leq V_{CC}$ .

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or  $V_{CC}$ ). Unused outputs must be left open.

## Recommended Operating Conditions (Ta=-40~85°C)

Symbol	Parameter	Test Conditions	Guaranteed Limit			Unit
			Min	Typ	Max	
V <sub>IO</sub>	Input Offset Voltage	V <sub>0</sub> =1.4V V <sub>CC</sub> =5.0-30V; R <sub>S</sub> ≤100Ω V <sub>ICR</sub> =0V - (V <sub>CC</sub> -1.5)V	-		9.0 5.0*	mV
I <sub>IB</sub>	Input Bias Current	V <sub>0</sub> =1.4V V <sub>CC</sub> =5.0-30V V <sub>ICR</sub> =0V - (V <sub>CC</sub> -1.5)V	-		400	nA
I <sub>IO</sub>	Input Offset Current	V <sub>0</sub> =1.4V V <sub>CC</sub> =5.0-30V	-		±150	nA
		V <sub>ICR</sub> =0V - (V <sub>CC</sub> -1.5)V			50*	
V <sub>ICR</sub>	Input Common Mode Voltage Range	V <sub>CC</sub> =5.0-30V	0		V <sub>CC</sub> -2.0V	V
I <sub>CC</sub>	Supply Current	R <sub>L</sub> =∞, V <sub>CC</sub> =5.0 R <sub>L</sub> =∞, V <sub>CC</sub> =30V	-		1.0* 2.5*	mA
A <sub>VOL</sub>	Voltage Gain	V <sub>CC</sub> =15V, R <sub>L</sub> =15KΩ	-	200*	-	V/mV
t <sub>1</sub>	Large Signal Response Time	V <sub>IN</sub> =TTL Logic Swing, V <sub>ref</sub> =1.4V, V <sub>CC</sub> =5.0V, R <sub>L</sub> =5.1Ω, V <sub>RL</sub> =5.0V	-	300*	-	ns
t <sub>2</sub>	Response Time (Note 6)	V <sub>CC</sub> =5.0V, R <sub>L</sub> =5.1KΩ, V <sub>RL</sub> =5.0V	-	1.3*	-	μs
I <sub>sink</sub>	Output Sink Current	V <sub>i(-)</sub> =1.0V, V <sub>i(+)</sub> =0V, V <sub>0</sub> ≤1.5V, V <sub>CC</sub> =5.0V	6.0*	-	-	mA
V <sub>sat</sub>	Saturation Voltage	V <sub>i(-)</sub> =1.0V, V <sub>i(+)</sub> =0V, I <sub>sink</sub> ≤4.0mA, V <sub>CC</sub> =5.0V	-	-	700	mV
I <sub>OL</sub>	Output Leakage Current	V <sub>i(+)</sub> =1.0V, V <sub>i(-)</sub> =0V		0.1*		nA
		V <sub>0</sub> =5.0V				
		V <sub>0</sub> =30V			1000	nA
V <sub>IDR</sub>	Differential Input Voltage Range	All V <sub>IN</sub> ≥GND or V-Supply (if used)			V <sub>CC</sub> *	V

\*=@25°C

## Typical Performance Characteristics

( $V_{CC}=1.5V$ ,  $T_A=+25^{\circ}C$ , (each comporator))

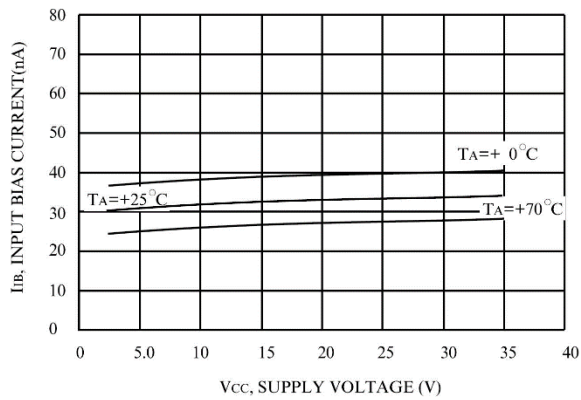


Figure 1. Normalized Input Offset Voltage

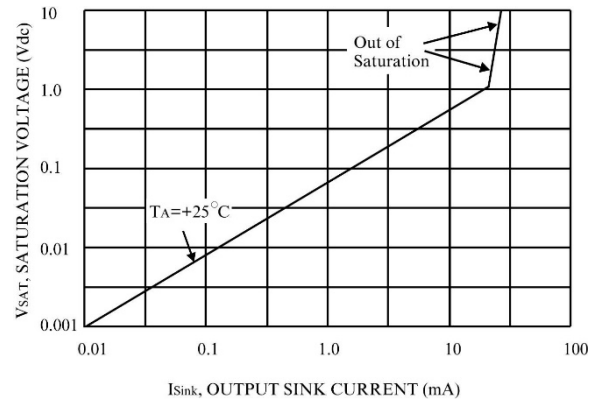


Figure 2. Input Bias Current

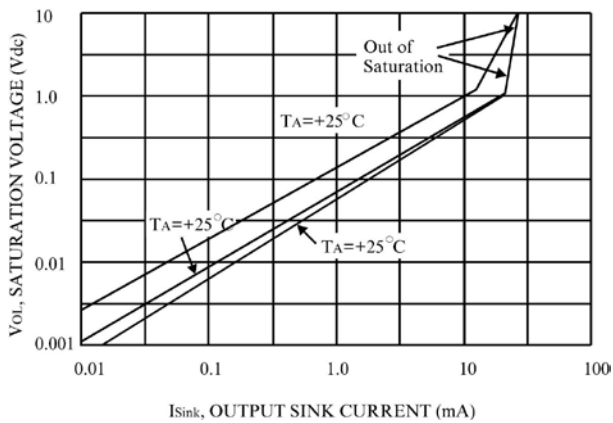


Figure 3. Output Sink Current versus Output Saturation Voltage

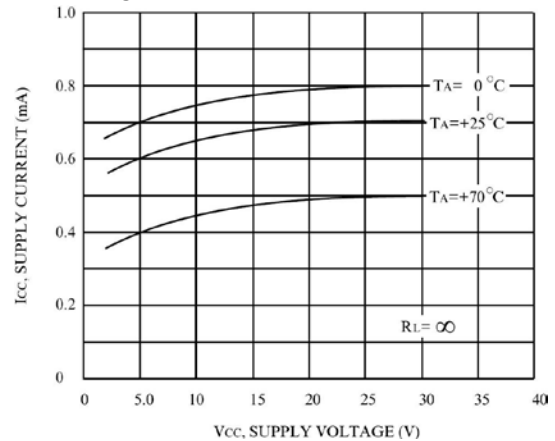


Figure 4. Power Supply Current versus Power Supply Voltage

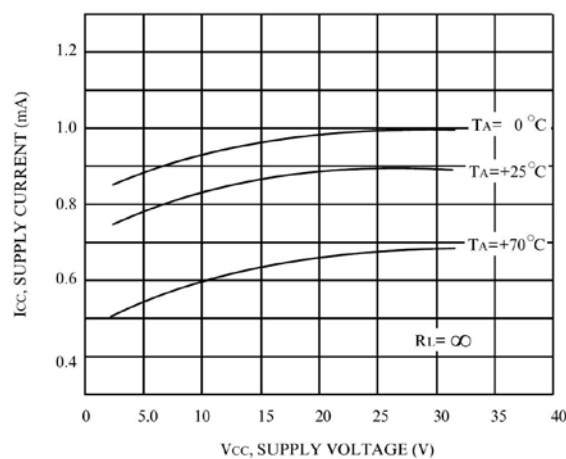
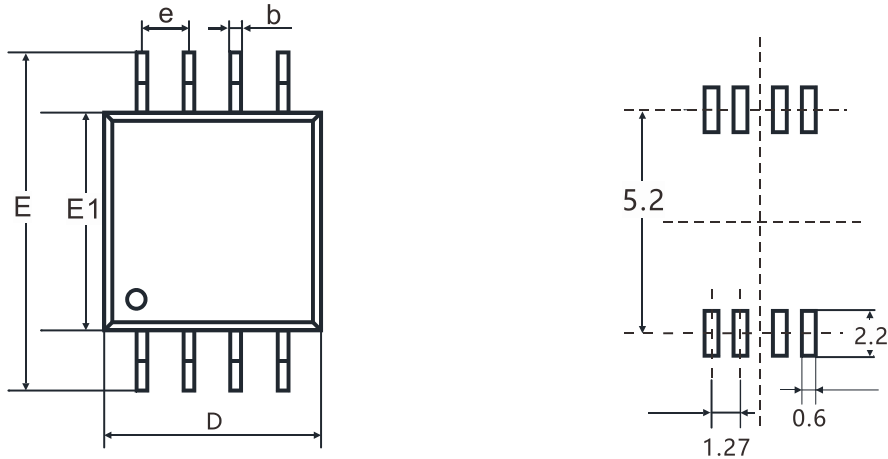


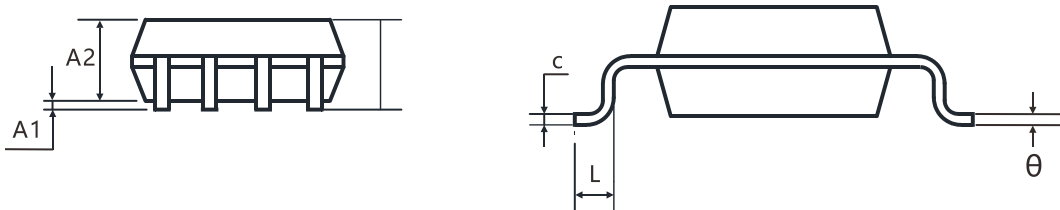
Figure 5. Power Supply Current versus Power Supply Voltage

## Package Information

### SOIC-8(SOP8)



RECOMMENDED LAND PATTERN(Unit:mm)



Symbol	Dimensions In Millimeters		Dimensions Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

## Package/Ordering Information

PRODUCT	ORDERING	TEMPRANGE	PACKAGE	PAKEAGE	TRANSPOT
CBM2903	CBM2903AS8	-40°C~85°C	SOP-8	CBM2903A	Reel,2500
	CBM2903ATS8	-40°C~85°C	TSSOP-8	CBM2903AT	Reel,3000